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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/845,344

05/01/2001

Richard W. Arnold

TI-27698.1

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7590

09/08/2004

Texas Instruments Incorporated
P.O. Box 655474, M.S. 3999
Dallas, TX 75265

EXAMINER

SARKAR, ASOK K

ART UNIT

PAPER NUMBER

2829

DATE MAILED: 09/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/845,344

Applicant(s)

ARNOLD ET AL.

Examiner

Asok K. Sarkar

Art Unit

2829

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 July 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 13-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 13-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 13 – 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Galloway, EP 633607.

Regarding these claims, Galloway discloses a semiconductor device comprising:

- (a) an electrically insulating substrate 26 (see Fig. 2);
- (b) an interconnect pattern on said substrate in column 4, lines 41 - 50;
- (c) a stud 16 coupled to said interconnect pattern over said substrate 26, said stud comprising a gold ball 17 and a compliant material of epoxy resin coating 18 (Gilleo, US 6,020,220 teaches that epoxy materials are inherently compliant in column 5, lines 5 – 36) over a portion of said gold ball in column 2, lines 11 – 19 and column 3, line 12 with reference to Figs. 1 and 2. Galloway teaches forming the gold ball by forming a ball bond in column 3, lines 10 – 49.

Galloway teaches that the substrate can be a variety of different types used with various semiconductor devices in column 4, lines 44 – 50 for the benefit of imparting excellent planarity for the attached die to the substrate in column 2, lines 3 – 10, but fails to teach that the substrate is used for application to a semiconductor carrier.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Galloway and use the substrate as a semiconductor carrier for the benefit of imparting excellent planarity of the attached die to the substrate to maintain good connectivity as taught by Galloway in column 2, lines 3 – 10. Additionally, it would have been obvious to one with ordinary skill in the art at the time of the invention to use Galloway's die/substrate attachment as temporary packages to house a single bare die, or a chip scale package for burn-in and other test procedure since the semiconductor manufacturers are required to test bumped dice prior to shipment.

5. Claims 17 – 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Galloway, EP 633607 in view of Lytle, US 5,674,780.

Galloway fails to teach the compliant epoxy material with silver-based flakes having sufficient hardness to penetrate the oxide film on the contact pads of the semiconductor devices.

Lytle teaches a method of forming an electrically conductive polymer bump in which they teach filling the epoxy resin with silver flakes in column 3, line 65 and column 4, line 1 for the benefit of providing conductivity to the epoxy.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to coat the gold ball by compliant epoxy resin filled with silver flakes for the benefit of providing conductivity as taught by Lytle in column 3, line 65 and column 4, line 1. The silver flakes will inherently have sufficient hardness to penetrate the oxide film on the contact pads of the semiconductor devices when pressure will be applied to make the contact.

Response to Arguments

6. Applicant's arguments filed July 14, 2004 have been fully considered but they are not persuasive.

Applicant's first argument (page 4 beginning at paragraph 3) is regarding the 102 (b) rejection for claims 13 and 16 as being improper since two references were used instead of one. As was pointed out in the previous rejection, the Gilleo reference was used only to show that the epoxy resins are inherently compliant materials as claimed in claims 13 and 16.

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Applicant's second argument (page 4 beginning at paragraph 5) with reference to using the insulating substrate for application to a semiconductor carrier has been already addressed earlier in the present action.

Applicant's other arguments in pages 4 and 5 regarding the elements of claims 13 – 15 and 17 – 20 have been already addressed in the present rejection and are taught by Galloway and Lytle as described in paragraphs 4 and 5.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

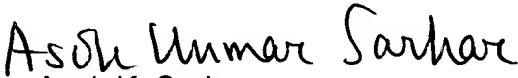
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Asok K. Sarkar whose telephone number is 571 272 1970. The examiner can normally be reached on Monday - Friday (8 AM- 5 PM).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Tokar can be reached on 571 272 1812. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

9. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Asok K. Sarkar
September 6, 2004

Patent Examiner